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Journal of the Society of Arts.

FRIDAY, DECEMBER 27, 1861.

ADDRESS OF CONDOLENCE TO HER MAJESTY.

The following address of condolence has been forwarded to the Secretary of State for the Home Department, for presentation to Her Majesty :—

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

We, your Majesty's most dutiful and loyal subjects, the Society for the Encouragement of Arts, Manufactures, and Commerce, incorporated by Royal Charter, humbly approach your Majesty, with the assurance of our devoted attachment to your throne and person, and of our respectful sympathy with your Majesty in the great affliction which has so unexpectedly befallen your Majesty and the Nation, in the early death of His Royal Highness the Prince Consort.

Whilst the death of a Prince, distinguished by rare intellectual gifts and eminent virtues, is deeply lamented by all classes of your Majesty's subjects, his loss is especially deplored by this Society, which has for many years enjoyed the great advantage of his judicious counsel and support.

His Royal Highness was elected President in 1843.

His high position, his refined tastes, his enlightened judgment and his candour; his great command of general principles and his power of applying them to details; and his special knowledge on a great variety of subjects, extended the influence and greatly promoted the objects of the Society. Science, Art, and Literature were, by his judicious patronage, constantly introduced to the notice and recommended to the favour of your Majesty.

The great conception of the Exhibition of 1851, with its countless influences on the progress of human industry, was due to His Royal Highness, and in overcoming the difficulties of such a new and gigantic work, he solved the problem of conducting future Exhibitions, and their success will be an ever recurring memorial of their author.

The Society can never forget the obligations which His Royal Highness has conferred on them, and they humbly express a hope that the recollection of his virtues and of his public services may, with God's help, in some measure soften the intensity of your Majesty's affliction.

That your Majesty may long reign over a loyal and

devoted people, is the prayer of your dutiful and loyal subjects and servants.

By order of the Council, sealed with the seal of the Society for the Encouragement of Arts, Manufactures, and Commerce, this twenty-seventh day of December, one thousand eight hundred and sixty-one, in the presence of

P. LE NEVE FOSTER, *Secretary.*

INTERNATIONAL EXHIBITION OF 1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £442,750, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

Notwithstanding the number of days in the last week on which no work was done, partly on account of the national mourning, and partly in consequence of the Christmas holidays, the progress made is very apparent, and may be pronounced to be highly satisfactory. So far has the building now advanced, that it is beginning to assume an air of completeness, which promises well for the easy fulfilment of the contract within the appointed time.

The eastern dome is no longer a cause of anxiety; all the ribs are in their places; three of them are entirely finished, and the others only want the top jointings; in a short period it may be expected to be ready for the glaziers. All the wood-work of the lower portion is fixed, and only waits to be boarded to be protected from the weather. The brickwork of the great arch over the entrance, which has a span of about 80 feet, is completed.

It may be seen that the dome scaffold at the western end of the nave has a somewhat different appearance to its fellow before the raising of the ribs. This is owing to the arrangements which have been made to fix the ribs, which are different from those on the opposite scaffold, and promise an easier and more speedy accomplishment of that object. The brick arch over the western end is also finished, and the arrangements for fixing the ribs being completed, the task itself will soon commence.

The flooring has been carried over the whole of the south-eastern and south central courts;

this portion of the work proceeds with a rapidity which is truly marvellous. Visitors can now walk on dry plank flooring over the whole of the southern courts, as well as the long corridors underneath the picture galleries. The offices underneath the smaller or water-colour galleries are also fast approaching completion, so that the staff of Her Majesty's Commissioners will soon be enabled to transact business in the building itself when it may be determined to be more convenient to do so.

The brickwork of the refreshment courts has been executed in cement, and will not be affected by the frost. It is nearly finished. The joiners' and carpenters' works are also in a forward state, and there seems no reason why the structural portions should not be completed with the rest of the building, although such a condition does not form part of the contract of Messrs. Kelk and Lucas. The plastering and decorations will take some longer time. A suggestion has been made that Messrs. Minton should floor the part which forms the entrance to the horticultural gardens with tiles, for the making of which they have obtained so deservedly high and wide-spread a reputation.

Some experiments have been commenced in the nave for colouring the interior, and are still in progress. They are under the direction of Mr. Octavius Hudson, who has obtained so much credit for his works in Salisbury, Ely and Chester Cathedrals, and who is known for his great learning on coloured decoration. It is obvious that, as there are large surfaces in the present building, which did not exist in the building of 1851, a very different system of colouring will be required, as great quantities of the primitive colours, suitable enough for thin lines, would be inappropriate here.

The acceptances of space are being fast returned from British exhibitors; no less than 2,500 have been received since Saturday last. It is expected that the total number will reach 8,000.

The method adopted for the production of the Illustrated Catalogue appears to be received with favour; many pages have already been taken by exhibitors for the more detailed descriptions and illustrations of their goods.

The Imperial Commission at Paris has issued its 24th bulletin, by which it appears that the detailed plans for the arrangement of space are completed. Exhibitors are requested to act, as far as possible, in concert, in order to render the whole exhibition as harmonious and effective as possible. Many of the French exhibitors, after complaining of the smallness of the space allotted to them, and after obtaining twice that allotment, now state that they will be unable to fill even the space originally placed at their disposal. Such a course of conduct threatens to

disarrange entirely the plans of the Imperial Commission, who may be put to great inconvenience to induce fresh exhibitors to come forward and fill the vacant spaces. French goods are to be delivered at the railway stations by the 10th of March, under the penalty of having the space destined for them transferred to others.

EXAMINATIONS 1862.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The attention of Secretaries of Institutions and Local Educational Boards, is specially called to Par. 5 of the Programme of Examinations for 1862, as follows:—

5. A detailed list of the Chairman, Secretary, and other Members of each Local Board, giving not only their names but their addresses and designations, should be submitted to the Council of the Society of Arts before the 1st of January, 1862. In some cases the Local Educational Boards comprise such large districts that, for the convenience of the Candidates, Branch Local Boards have to be formed within the Districts. Wherever this is the case, the names and addresses of the members, both of the District Board and of its Branch Boards, must be forwarded to the Secretary of the Society of Arts. All changes in the composition of the various Boards now in existence, or to be formed hereafter, should be immediately notified to the Society of Arts.

ON THE PROSPECTS OF CLASS I. IN THE INTERNATIONAL EXHIBITION OF 1862.

BY ROBERT HUNT, F.R.S.

In 1850 there was considerable discussion on the question of including native mineral produce in the Great Exhibition of 1851, which many persons thought should be confined to manufactures. The discussion eventually terminated in the formation of Class 1, devoted to Mining, Quarrying, Metallurgy, and Mineral Products.

Her Majesty's Commissioners for the International Exhibition of 1862 have come to a similar determination, the only difference being that Class 1. is now considerably extended, and several mineral and metal manufactures are embraced by it. There is great difficulty in knowing where to draw the line, and much confusion would arise in the arrangement of so large a collection of industrial products, unless some latitude was allowed. With mining and quarrying a tolerable degree of exactness might have been observed. The ores as raised from the earth, and the stones as broken out of the rock, with the appliances for facilitating the labours of man in those dangerous and difficult operations, would have been alone comprehended. Metallurgy opens a wide door, and we scarcely know when to close it. It may be said that the metallurgy of iron ends with the production of the pig-iron; but, is not a casting direct from the furnace, although it may be highly ornamental, as much a metallurgical process as the development of an ill-shaped pig? The production of a bar of iron or of a sheet is considered fairly a metallurgical operation, but it is not clear why a rolled rail is not equally so. Beyond this, in the Exhibition we have to deal with the dislike of the exhibitors to separate their manufacturing productions one from the other. Hence, in many cases, the unmistakeable results of handicraft will be seen in connection with the products of the furnace.

Similar remarks apply to purely mineral products, and the visitors to this class, during the coming summer, will not be displeased to see many beautiful examples of workmanship in the stones and marbles of our own country, in contact with our native products in their crude state.

There appeared, at first, some apathy on the part of miners and quarrymen, and there were grounds to fear that our mineral products might be imperfectly represented. This was, however, dispelled soon after the formation of the National Committee. The first act of that body was to issue a circular, simply pointing out what it was desirable should be exhibited, and the response thereto plainly showed that the apparent indifference was referable to uncertainty and not to unwillingness. Many persons thought there could be nothing of interest in a mass of copper or lead ore, and others imagined that a block of sand-stone could have no value in an exhibition which aimed at surpassing everything that had hitherto been done in gathering works of the highest art together. When, however, they were informed that it was a desirable thing to exhibit the products of mines and quarries, the applications for space proved their desire to co-operate in the great work of the International Exhibition.

Before the 1st of October nearly twenty-six thousand square feet of floor-space were applied for, and all available wall space was, to a certainty, covered. This class, like every other, has suffered at the hands of Her Majesty's remorseless Commissioners, who, sitting like Terrestrial Joves, hidden by the clouds of their own Olympus, have given here a portion and there a portion, of the huge building, which rises so grandly and so rapidly on the Gore estate,—every portion being, by the common voice, declared to be too small.

The echoes of the murmuring committees were the first notes which broke upon the ears of the Commissioners—the prelude of a coming storm, which, penetrating from all quarters, for some time threatened serious damage. Tornadoes, cyclones, and common storms are the sooner exhausted the more powerful the exciting energy is at first. What is true of the tempests of nature is also true of the outbursts of the human breast.

The cry for more space, when there was no more to give “waxed fast and furious,” but having exhausted itself, it subsided into the expression of a desire to make the best of that which the Commissioners had given. No division importuned more earnestly to be enlarged than Class 1. The committee in charge of this class were all men who have identified themselves with the mineral products of the country, and they seriously feared that the industry to which England—next to the indomitable spirit of her sons—owes all her greatness, was to be “cabined and confined” within a little more than two thousand square feet of floor space. These fears are being dispelled—the allotments have been made—the process of abridgment carried out with all the judgment which men, acting in ignorance of many of the conditions, could give, and, with a little anger—some murmurs, loud rather than deep—many petitions, in the best possible spirit—and the adjustment of evident misconceptions—all is subsiding into that quiet which indicates contentment.

The actual floor space within the building, which will be occupied by this class, will be about four thousand feet, in addition to which an open court will receive many of those things which will bear exposure, or such as exhibitors may be desirous of displaying, and may be willing to protect at their own cost.

The more experience we have in dealing with men, the more we are convinced that they are not so intractable as some have said them to be. There is a sound philosophy in the mode of reasoning adopted by the intelligent costermonger towards his obstinate quadruped. The principle of promising oats and hay, and persuasively saying, “Gee up, Edward,” is as unfailing with bipeds as it is said to have been with the four-legged creature of the story.

It is now time we should say a few words on the prospects of Class 1, and its promise in comparison, especially, with the great Exhibition of 1851, and, incidentally, with the Paris Exhibition of 1855. That division of this class in which will be represented the metalliferous minerals of the United Kingdom will be of considerable commercial interest.

The Lead Hills of Lanarkshire, once the scene of a wild rush after gold, and always a district producing rare minerals, will send a series of their treasures. Lead ores and their products are coming from Durham, Northumberland, and Cumberland. The mountain limestone regions of Yorkshire will furnish lead and copper, and Cardiganshire and Flintshire will exhibit varieties of their galenas and blendes. The local committees of Exeter, Tavistock, and Redruth, are carefully looking up the more remarkable examples of the minerals of Devonshire and Cornwall. That tin ore which has been worked in Cornwall and on Dartmoor for more than two thousand years, and which is now being obtained at the rate of ten thousand tons per annum, will be shown as obtained from the stream and from the mine. Several varieties of copper ore, many of the rich argentiferous lead ores of the West, the zinc ores of these counties, the sulphur ores (iron pyrites) and many others, not quite so important, but remarkable as being rare, are to be amongst the illustrations of nature's bounty to us. Ireland, too, sends over her lead, copper, and pyritic ores.

Although the Exhibition of 1862 will not exhibit such a complete collection of iron ores as the industry of Mr. S. Blackwell brought together in 1851, yet most of the new discoveries, and they are many and important, will find a place. The iron ores of Weardale, those of Cleveland, and the recent discoveries in the West Riding of Yorkshire, the remarkable deposits of Lincolnshire, those of the Midland Counties, and the best examples from Somerset, Devon, and Cornwall, will form an interesting series. Amongst the metalliferous minerals, examples of gold from Devonshire will be found; but of the more important gold quartz of Merionethshire we hear nothing.

Coals promise to be abundant. There is scarcely a useful seam from which an example will not be sent. In 1851 there were some gigantic blocks, many of them of little interest, and showing no more of the quality of the coal than would have been shown by a smaller specimen. We hear but little of such masses now. Two or three exhibitors desire to show the entire thickness of the seam they work, and a very few have some peculiarity which can only be seen in a mass of good size; cubical pieces of about eighteen inches will be the rule. In most cases, the local committees have endeavoured to prevent reduplication, and, in others, the specimens to be exhibited have been determined by the Coal Trade Associations.

Of the earthy minerals there will not be a large display. Fuller's earth, Barytes Chalk, sands for glass making, and polishing powders are, however, amongst the lists of things for which space has been applied for.

Dorsetshire sends its celebrated Potter's clay, and from the neighbourhood of Newton Abbot, in Devonshire, several examples of the so called “Teignmouth clay,” (because it is shipped from that port), and specimens of articles manufactured from it, will be exhibited. The kaolin or porcelain clay of Dartmoor, and from the extensive clay works around St. Austell, in Cornwall, will form an interesting series. The fire clays of the coal measure districts of the Midland and Northern Counties, with gas retorts, glass-house pots, and other manufactures from them, will be fully shown. Here, as in many other divisions, there arises what we may term an overlapping of the classes. Class 35 is devoted to pottery, and should include all the manufactures, but many of the exhibitors prefer placing in Class 1, with their clays, the articles made from that material. Melting pots and crucibles have been placed in Class 35; but the makers of them, regarding them as truly metallurgical, prefer seeing them in Class 1.

The building and ornamental stones of the kingdom promise to be fully represented. The sandstones of the coal measures of the North; the dolomites of Yorkshire and the neighbouring counties; the Liassic limestones, the oolites, especially those from the neighbourhood of Bath; Portland stone, Purbeck marble, Stonesfield slate, and numerous other varieties, will illustrate our richness in

the materials of construction. Granites, from Scotland, from Leicestershire, and from Cornwall, will form prominent objects, since many large examples will be elaborately wrought, and some of them highly polished. The Serpentine of Cornwall, certainly the most beautiful ornamental stone of these islands, will be exhibited in some new and interesting forms. The Irish serpentine, or Connemara marble, will also form a striking object.

The true marbles of Devonshire and those of Derbyshire will come forth prominently. Several tables are manufactured from them; and ornamental vases and other things have space reserved. We learn that the vases made from the black marble of Derbyshire will be of unusual size and great elegance.

The Port Madoc local committee promise a good series of slates and slabs, while the Llangollen quarries will send one of the largest slabs ever got out of a quarry. The articles, such as chimney pieces, tables, &c., manufactured from slate and enamelled, will be numerous.

Many models illustrating mining operations are in progress of construction, some of them of large size, and very instructive. Sectional models, as of the iron deposits at Whitehaven; of the copper and tin lode at Dolcoath, in Cornwall, made from the rocks themselves, and thus showing the actual conditions, will add greatly to the interest of this section. Models of plans for ventilation; models of safety cages, and actual safety cages, will be shewn, as will also several machines employed in "dressing" the metalliferous ores for the market.

From this rapid sketch it will be evident that the mineral produce of the country will be fairly illustrated.

In metallurgy, the examples of iron will be numerous, and, at the same time, as nearly all varieties of pig iron will be found in the Exhibition, there will be some of the most remarkable examples of rolled iron that have ever yet been shown. Rails from 60 to 100 feet in length without a weld; bars of remarkable size and length; sheets of iron of most unusual dimensions; and armour plates which have resisted the battering power of Armstrong's guns, will be there. Cranks, one weighing above 20 tons, and beams of singular size and strength, will prove the capabilities of British forges. Tin plates will be well illustrated, but the smelters of tin are not patriotic enough to aid in this industrial movement, and unless the Redruth Local Committee persuades a Cornish smelter to exhibit, the most ancient metallurgical process of the country will not be seen.

The metallurgy of copper, on the contrary, will be fully illustrated, as will that of zinc, lead, and silver, with the refining of cobalt and nickel. Even gold, platinum, and other precious metals, will be shown in their processes of refining and the like, tin alone being unrepresented. Space has been secured by exhibitors, perhaps not so much as they may have desired, but still, we hope, ample for the exhibition of the more striking objects. Let us hope that there will be a unanimity of feeling amongst them, and that in the difficult task of arrangement there will be shown an accommodating spirit. It would be in the highest degree desirable, if the exhibitors could, by communicating one with the other, obviate that reduplication of articles which will possibly arise if each one works in ignorance of the plans of his neighbour. Every one is aware that the manufacturer looks to an exhibition of this high character as a means for making him better known to the world, and it is intended that this should be one of the objects. But let it never be forgotten that the great end in view is an educational one. We are to learn, from the works of other countries, to improve our own manufactures, and in return, we are to impart to the strangers who visit us, information which will be valuable to them. By the collision of minds new truths are developed; by an industrial contest fresh powers are called into play, and the world is benefited by the production of something which either adds to the pleasures of existence, or ministers to the necessities of man.

CARBURATION OF GAS.

A careful experiment as to the efficiency of this process was made last summer by direction of the Commissioners of Sewers for the City of London, and the following are extracts from reports by Mr. Haywood, engineer to the Commissioners, and Dr. Letheby, Medical Officer of Health:—

"The patent of the United Kingdom Carburing Gas Company is for placing near to the gas burners a receptacle containing coal naphtha, the gas passing through or over this takes up, and becomes enriched by, the addition of the volatile hydro-carbons contained in the naphtha, and the illuminating power of the gas is thereby increased; the quality of the naphtha employed determines mainly the degree of illuminating power gained, and the chemical and photometrical experiments show that it varies from 25 per cent. to 77 per cent.*

"Moorgate-street, lighted by the Chartered Gas Company, was selected as well adapted for the experiment, there being an equal number of lamps upon each side of the way, but one or two private lamps only in the street, and but few shops; the street is, therefore, after an early hour of the evening almost entirely without artificial light, excepting that which it derives from the public gas lights.

"The patentees stating, that by the application of their process equal light would be given with half the ordinary consumption of gas, the burners were regulated accordingly. The lamps experimented upon were twelve in number, six upon the western side, which were fitted with the ordinary batswing burners calculated to consume upon the average of the night 5 cubic feet of gas per hour, and six upon the eastern side, fitted with batswing burners calculated to consume $2\frac{1}{2}$ cubic feet per hour. The latter burners having attached to them the carburing apparatus of the company, each of the twelve burners had a meter attached to it, to ascertain the actual consumption. No pressure regulators were fixed upon the lamps.

"The registration commenced upon the 19th of June, and terminated upon the 19th of July inst., the experiment extending therefore over thirty nights, and gave the following results:—

"That the burners without the carburing apparatus consumed about 4.39 cubic feet per hour.

"That the burners fitted up with the carburing apparatus consumed 2.09 cubic feet per hour.

"No photometer was employed, the equalization of the

* The apparatus consists of a chamber for holding coal naphtha, and of a contrivance for directing the stream of gas over the surface of the naphtha. By this means the gas becomes charged with volatile hydro-carbons, and acquires a higher illuminating power. Three sets of experiments were made for the purpose of determining the value of the apparatus. In the first set a naphtha rich in benzole was employed, and the results were, that at first it raised the illuminating power of ordinary twelve-candle gas to twenty-four candles, and in the course of three days the power fell to eighteen candles, the mean of the whole being twenty-one candles. This is an increase of 77 per cent., and it was effected by giving 10.77 grains of naphtha vapour to each cubic foot of gas. In both of the other sets of experiments an inferior kind of naphtha was used, and in one case the average increase of illuminating power, during a period of ten days, and after the passage of a thousand cubic feet of gas, was 25 per cent. In the other case, after a duration of five days, the average increase was 30 per cent. The former was effected by the addition of four grains of naphtha vapour to each cubic foot of gas, and the latter by 6.56 grains. These data are sufficient to indicate the general capabilities of the apparatus, for they show that with a good naphtha, supplied in proper quantity, and furnishing from ten to eleven grains of vapour to each cubic foot of gas, the illuminating power of an inferior gas may be nearly doubled. A less volatile naphtha, giving only from four to seven grains of vapour per cubic foot, will increase the power of twelve-candle gas from 25 to 30 per cent. I am, therefore, of opinion (says Dr. Letheby), that the apparatus is of practical value as a carburetting agent, and that if supplied with good naphtha, in proper quantity, there will be no difficulty in sustaining a power of twenty candles with ordinary coal gas.

amount of light given by the two classes of burners was a matter of judgment. The District Inspector of the Commission, who saw the lights nightly, reports his opinion that the light given was perfectly equal, and that his opinion is strengthened by collecting those of certain residents in the neighbourhood. Mr. Haywood's opinion is that the light of the 2½ feet burners was upon the average of the month inferior, although but very slightly so, to that of the 5 feet burners. The Inspector of the Chartered Company coincides with him in this.

"No chemical analysis was made of the naphtha used; but it is stated by the patentees to have been of the best quality.

"The deduction from the experiment is, that with naphtha of equal quality to that used, during the warm months of the year 3 cubic feet of carburated gas may be considered as about equal to 5 cubic feet of gas not carburated.

"Assuming these to be data applicable to all seasons of the year, Mr. Haywood estimated the saving to be effected by the process, and after allowing for the cost of the apparatus, and for periodically filling it with naphtha, and after giving credit at the present price of the gas supplied to the public lamps for the quantity not consumed, it shows that the reduction in the cost of each public lamp will be at least £1 per annum; and their being 2,825 lamps within the City, that a saving of about £2,825 would be annually effected.

"The only disadvantage observed during the experiment was that the reservoir, as constructed, throws a disk of shadow round the base of the gas lamp standard, but the depth of shadow is but slight; this advantage may be largely rectified by an alteration in the form of apparatus.

"Mr. Haywood does not pledge himself to any of these figures as exact, for the experiment as conducted cannot lay claim to be considered minute or exact in its character; but he believes it may, nevertheless, be taken as giving a close approximation to the truth; it is the mean of the rough results of practice, and the refined processes of the laboratory from which reliable data are generally drawn; in this case the results of the experiment are supported by laboratory experiments, and consequently there seems but little doubt that this mode of applying naphtha to the public lights (for the naphthalisation of gas itself is by no means new), may lead to a considerable reduction in the cost of public lighting; but what that reduction ultimately would be, would depend upon points which can only be determined by the application of the process to a considerable number of lamps for some length of time, and at different seasons.

In a more recent report, the above gentlemen say:—

"With regard to the carburating process, we are of opinion, from the data obtained by the laboratory experiments quoted in the report to the Commission of the 30th July last, and the experiments made on the public lamps in Moorgate-street, during the months of June and July last, that the process of carburation appears to be capable of economising the use of gas in the public lamps, to the extent of from 40 to 50 per cent. This conclusion is founded on the assumption that the best quality of naphtha is to be used, namely, a naphtha which will give to the gas continuously a proportion of about ten grains of volatile hydro-carbon to each cubic foot of gas, these being the average results of the laboratory experiments. If an inferior kind of naphtha be employed, the results will be less satisfactory; for the laboratory experiments show that a naphtha yielding four grains of volatile hydro-carbon will increase the illuminating power of the gas to only about from 15 to 20 per cent."

RAILWAYS IN HOLLAND.

The following communication has been received from M. J. W. Del Campo, of Holland:—

"Railways may now be regarded as necessities of life,

and, however high were the expectations of the invention of Stephenson, we have not been disappointed; on the contrary, wherever the steam locomotive has appeared, prosperity has increased, isolation and ignorance have given way, traffic and civilisation have advanced. It is astonishing, therefore, that this valuable means of communication is not more generally used in some countries, so as to increase still more considerably their commerce and industry.

"How was it that a country like Holland, generally known and highly esteemed for its trade and industry, did not avail itself of railways, so as to keep pace with the general progress in other countries? Its most flourishing provinces, where the cultivation of the soil and the breeding of cattle have made great progress, are completely separated from the general means of communication; their products are sent to the nearest harbour to be embarked for the great metropolis of the world, while persons travel by stage coaches, like those used half a century ago in England.

"The great inclination of the people for water communication, the great difficulties of constructing railways over rivers and arms of the sea, which penetrate the country and form many islands; the fact that their construction could not be a profitable enterprise for any private company, and the hesitation on the part of Government to undertake their construction itself against the rules of a sound policy may account in some way for this. However, these are not to be considered as valid reasons for being deprived of railways, and, if they are now considered advantageous, why were they not so ten years ago? When the nature of the country made private companies hesitate to construct them, why should not the Government have done it? There are, indeed, very few railways which have been profitable to the companies, but who can tell how many millions they have increased the wealth of the people, or how much they have contributed to their civilisation and welfare?

"I am glad, however, to be able to say that railways are now being constructed in Holland. The Government is making use of its able civil and military engineers to overcome the difficulties of crossing the rivers, and has in view the carrying out of a complete railway system within ten years. There will be constructed about 900 miles of railway, at an expense estimated at £7,000,000, of which a third part is to be expended on railway bridges only. These railways will unite the following towns:—Amsterdam, Hague, Rotterdam, Breda, Maastricht, Utrecht, Arnhem, Zutphen, Assen, Harlingen, New Diep, and others.

"Besides the railway, a canal will be made to unite the capital, Amsterdam, immediately with the ocean.

"This railway system will be beneficial to the country, the production of the soil and of industry increasing in proportion as the means of communication improve, and will be at the same time of much importance to Great Britain. The commercial towns of Holland will thus be brought nearer to England's sea ports, and the intercourse will be greater. It must be beneficial to both countries, whose histories are so connected with each other. In the great battle for liberty, they have both marched in the same course; in the promotion of commerce, they both have shown themselves energetic and successful. May they always work together to promote civilisation, to cultivate peaceful sentiments, and increase the welfare of their populations."

NEW BLACKFRIARS BRIDGE.

At the last meeting of the Court of Common Council, the report of the committee on the subject of the new bridge at Blackfriars was read.

It appeared to the Committee, after mature deliberation, that the best mode of satisfactorily answering the reference was to request the most eminent civil engineers to send in designs and estimates for the contemplated struc-

ture. Accordingly, invitations for that purpose were forwarded to Mr. P. W. Barlow, Mr. G. P. Bidder, Mr. Joseph Cubitt, Mr. John Fowler, Mr. John Hawkshaw, Mr. Thomas Page, Sir John Rennie, and Messrs. Walker, Burgess, and Cooper, accompanied by an intimation that, having regard to the Royal Commission then sitting for embanking the Thames, and to the probability of an embankment being carried out to some extent, it was essential that provision should be made for that contingency in the designs for the new bridge. They were also reminded that the London, Chatham, and Dover Railway Company had submitted to the Corporation of London a plan for the construction of a railway bridge across the Thames to the eastward of Blackfriars bridge. Subsequently, applications were received and complied with for permission to send in designs from Mr. R. P. Brereton, Mr. James Brunlees, Mr. Thomas Greenhill, and Mr. R. W. Mylne. The committee considered it prudent to leave the judgment and taste of the scientific gentlemen invited to compete wholly uncontrolled and unfettered, so as to obtain the most original suggestions, and afford each an opportunity of explaining the reasons which had guided him in the preparation of the design. Their anticipations had been fully justified by the results, and in every instance the engineers had satisfactorily shown they had carefully considered the most important requisites in connection with the subject, namely, the approaches to the proposed new bridge; the roadway and footway over it; the provisions for the navigation of the river in the headway and waterway under the various arches; and otherwise in providing for the progressive increase of traffic in the locality of the bridge, and for the temporary traffic during the erection of the new structure. The designs submitted were twenty in number, and comprised four for a stone bridge, five for one of wrought iron arched, one for a wrought-iron girder bridge, nine for a cast-iron arched bridge, and one for an iron bridge, but not clearly indicating whether of wrought iron or cast. The designs so sent in had been exhibited for several months at Guildhall. Those for a granite structure were submitted by Sir John Rennie, of three arches, the centre span being 236ft. 10in.; Mr. George Rennie of five arches, the centre span being 150ft.; Mr. George Rennie, another, of five arches, each span being 125ft., and Mr. R. W. Mylne, of five arches, the centre span being 156ft. 6in. The designs for a wrought iron arched bridge were those submitted by Mr. John Fowler, of three arches, with a centre span of 275ft.; the same gentleman, one of five arches, the centre being 185ft.; Mr. John Hawkshaw, of three arches, the centre and other spans being 200ft. each; the same gentleman, one of five arches, the centre and others being 145ft. each; and Mr. P. W. Barlow, of three arches, the centre being 250ft. The design for a wrought iron girder bridge was submitted by Mr. R. P. Brereton, of five openings, the centre being 220ft. Those for a cast iron arched bridge were sent in by Mr. Thomas Page, of three arches, having a centre span of 280ft.; the same gentleman, one of five arches, with a centre span of 156ft.; Messrs. George P. Bidder and Edwin Clark, of five arches, each being 175ft.; Mr. George Rennie, of five arches, with a centre of 160ft.; the same gentleman, of five arches, with a centre of 175ft.; another, of five arches, having a centre span of 180ft.; Mr. R. W. Mylne, of five arches, with a centre of 166ft. 6in.; Mr. Joseph Cubitt, of five arches, having a centre span of 150ft.; and Mr. James Brunlees, of five arches, having a centre of 172ft. The remaining design for an iron bridge was submitted by Mr. Thomas Greenhill, of seven arches, having a centre span of 120ft.; with a tube for a railway, and he stated that it might be converted into a five-arched bridge. During the consideration of the several designs the committee had regard to the length of time necessarily occupied in the construction of a bridge of stone more than of one with iron arches, and to the facts that the depth required at the crown of the arches of a stone bridge would prejudicially affect the gradient of the approaches and roadway of the bridge, and

that the cost of a stone bridge was in all cases so much more than of those of iron; and they came to the conclusion that it was not desirable to adopt a design for a stone bridge. They held it essential to preserve the present lines of approach to the proposed bridge on the north and south sides of the river, and that the centre line of the new bridge should correspond with the centre line of the present approaches. Adverting to the circumstances that London has become augmented in population and extent exceeding that of any other European capital; that its wealth has increased in far more than a proportionate rate; that it is the seat of government and legislation; and that in the exact locality and vicinity of Blackfriars were being constructed the termini of the most important railway undertakings, which would lead to an increase of traffic the amount of which could not be over-estimated, the committee are of opinion that great urgency exists for all municipal and local authority to be energetically exerted to provide for the obviously certain and enormous requirements that will shortly arise for traffic accommodation. Actuated by these considerations, and desiring that the city of London should hold its place, deservedly eminent as it is for the useful exercise of its ancient municipal rights in the promotion of the comfort and convenience of the public, which are to be partially secured by the provision of proper means of intercommunication from one part of the metropolis to the other, as well for purposes of social as commercial and manufacturing pursuits, they think that the present opportunity should not be lost of maintaining a well-earned reputation, in contributing extensively to the architectural decoration and beauty of the metropolis, of which, even at this day, so many exquisite and perfect examples are to be found in the city of London. They are also fully impressed with the actual necessity for providing abundant facilities for the navigation of the river; for the transit of merchandise, and for passengers by road and footways. They have likewise had due regard to the time within which the proposed structure may be erected, and they submitted for the approbation of the court the design of Mr. T. Page, for a bridge of three iron arches, on granite piers, believing it to be best calculated to meet the requirements of the public. No disturbance of the traffic would take place during its construction, provision for that being made without a temporary bridge; and Mr. Page had estimated the expense of executing the whole of the requisite works at £245,000. They cannot, they say, but acknowledge the manifest grandeur of the style and beauty of the proposed structure, which they deem worthy in all respects of this great municipality. They, therefore, recommend the design of Mr. Page for adoption, omitting, however, the sculptured ornamental groups on the piers, such being merely suggestive that the corporation may at some future time, if so minded, in so conspicuous and suitable position, have the opportunity of commemorating any event or circumstance of national importance. They also recommend that in the event of the court adopting his design, Mr. Page be retained as the engineer to superintend the requisite works.

RAILWAY BILLS FOR 1862.

The plans and sections of proposed works specified in the following railway Bills have been deposited at the Board of Trade for the ensuing session of Parliament:—

Abbeyholme, Leigate, and Bolton; Aberystwith and Welsh Coast; Alford-valley; Andover and Great Western; Andover and Redbridge; Andover, Redbridge, and Southampton.

Bala; Bala and Dolgelly; Balham and Putney Junction; Banstead and Epsom Downs; Barnsley Coal; Berwickshire; Birkenhead; Birkenhead, Flintshire, and Holyhead; Birkenhead and West Cheshire Junction; Bishop Walton, Botley, and Bursledon Down; Bognor, Chichester, and Medhurst; Bradford, Wakefield, and Leeds; Breandown and Weston-super-Mare; Brecon and

Merthyr Tydvil; Bridge of Weir; Bristol and South-Western Junction; Bristol and Clifton; Bristol Port and Pier; Bristol and South Wales Union.

Caledonian (branches); Caledonian (deviations); Cannock Chase Extension; Cannock Mineral Extension; Carmarthen and Cardigan (extension and branches); Carnarvonshire; Carlow, Tullow, and Newtonbarry; Cork and Youghal; Cork, Middleton and Fermoy; Corwen, Bala, and Port Madoc; Cowbridge, Cowes, and Newport; Crystal Palace and South London.

Daventry Extension; Dayton Junction; Deeside Extension; Dowlais Valley Mineral; Dove Valley; Dublin Metropolitan; Dundalk and Enniskillen (Extension).

Eastern Counties (Wisbeach and Peterborough); Eastern Counties (extension at Colchester); Eastern Counties (new lines in Middlesex); East Gloucestershire; East Grinstead; Groombridge and Tunbridge Wells; Eden Valley; Edgware, Highgate, and London; Edinburgh, Dunfermline, and Perth Junction; Edinburgh and Glasgow (extension); Ellesmere, Ruabon, and Shrewsbury; Ellesmere, Oswestry, Ruabon, and Shrewsbury; Enniskillen and Bundoran (extension to Sligo).

Fermoy, Lismore, and Dungarvan; Frosterly and Stanhope; Furness.

Garston and Liverpool (deviations); Glasgow and Renfrew Junction; Great Northern, No. 1; Great Northern, No. 2; Great Northern and Western of Ireland; Great Western (additional powers); Greenock and Wemyss Bay.

Hammersmith, Brentford, and Kew; Hatfield and St. Albans; Hereford, Hay, and Brecon; Holbeach Junction; Horsham, Dorking, and Leatherhead; Hull and Hornsea; Hull and West Riding Junction.

Isle of Wight.

Keighley and Worth Valley; Kent Coast; Kensington Station, and North and South London Junction; Kettering and Thrapstone; Kingston and Eardisley.

Lancashire and Yorkshire (Doncaster, Goole, and Hull Junction); Lancashire and Yorkshire (additional powers); Launceston and South Devon; Leeds, Bradford, and Halifax Junction; Ledbury and Gloucester; London, Brighton, and South Coast (enlargement of stations); London, Brighton, and South Coast (new lines); London and Blackwall; London, Chatham, and Dover (junction at Battersea); London, Chatham, and Dover (extension to Walmer and Deal); London, Edgware, and Bushey; London and Midland; London and North-Western (additional powers); London and South-Western (additional powers); London and South-Western and Andover and Redbridge; Lostwithiel and Fowey; Llanidloes and Newtown, Mid-Wales, and Manchester and Milford; Llanelly; Lymington; Linton and Dolphinton.

Manchester, Sheffield, and Lincolnshire (additional powers); Manchester, Sheffield, and Lincolnshire (central station in Liverpool); Manchester and Milford Rhayader branch); March and Askern; Marton and Hanbury; Maryport and Carlisle; Market Drayton and Newport; Metropolitan; Metropolitan and Thames Valley; Merionethshire; Midland (Rowsley and Buxton); Mid-Wales (deviations); Mid-Wales (branch); Mid-Wicklow; Mid-Kent and Addiscombe; Mid-Sussex and Midhurst Junction; Mold and Wrexham; Mortonhamstead and South Devon.

Nantlle; Newport and Ryde Direct; Newcastle (deviation); North British (Monkton Hall, Omistown, and Dalkeith branches); North Devon and Okehampton; North-Eastern (Market Weighton, Beverley, and Hull branch); North-Eastern (Hull and Doncaster); North-Eastern (Blaydon to Conside); North-Eastern (Branch Valley); North Metropolitan Junction; Norwich and Spalding.

Oswestry, Ellesmere, and Whitechurch; Oswestry and Newtown, Llanidloes and Newtown, and Shrewsbury and Welchpool; Oswestry, Shrewsbury, and Ellesmere.

Parsonstown and Portumna, Radstock and Keynsham; Ramsgate, Sandwich, Deal, and Dover; Rickmansworth, Amersham, and Chesham.

Sevenoaks; Severn and Wye; Scottish Central;

Scottish Northern Junction; Scottish North-Eastern; Shrewsbury and Hereford; Shrewsbury and Welchpool; Sidmouth; South-Eastern (Tunbridge and Dartford lines); South Yorkshire (Sheffield and Thorne); South Yorkshire (Extension to Hull); South Leicestershire (deviations); Southampton and Netley; Southampton and Isle of Wight; South Staffordshire and Central Wales (Dudley and Bridgnorth); Spalding and Bourn; Stamford and Essendine; Stafford and Uttoxeter; Stockton and Darlington (Towlaw and Crook); Swansea, Neath, and Brecon Junction.

Tendring Hundred; Tewkesbury and Malvern; Thames Embankment (North and South); Tottenham and Hampstead Junction.

Uxbridge and Rickmansworth (deviation).

Vale of Clwyd; Victoria and Pimlico.

Waterford and Limerick and Limerick and Ennis; Wellington and Cheshire Junction; Wellington, Drayton, and Newcastle; West Cheshire; West Hartlepool (Dock Extension); West Galway, West Riding, Hull, and Grimsby; West Midland (Merthyr, Tredegar, and Abergavenny, lease and extension); West Midland (additional works); West Shropshire Mineral; Whitechurch, Wrexham, Mold, and Connah's Quay Junction; Weymouth and Portland.

THE OIL SPRINGS OF AMERICA AND CANADA.

Mr. Alexander Macrae, oil and produce broker, of Liverpool, in a circular dated 16th December, says:—

"The introduction of petroleum, kerosine, photogene, or rock and well oil, is making tremendous strides, though it does not surpass the prediction in my first circular, namely, that it would be second only in extent to cotton. I will even go a step further, and venture to assert that if the rocks and wells of Pennsylvania, Canada, and other districts continue their exudation at the present rate of supply, the value of the trade in this oil may even equal American cotton. Montreal (internally, and likely externally by this time) is lit with the white refined, and I can see no reason why London and Liverpool should not also be, for the oil gas distilled from the raw petroleum is immensely superior and much more brilliant than our own coal gas. For years we have sent coals to America for gas works, and it will be a singular freak of events if she and Canada should now supply us with a better expedient. Invested interests will perhaps stay it for the moment, but will they ultimately?

"The refined for burning (known in this country as paraffin oil, and of which about 500 tons a week are sold), has been selling at £30 to £40 per tun (of 252 gallons) for yellow to white, while the crude varies in value from £6 to £25, according to test. The merits of the petroleum will be better understood when importers are informed that besides the uses already named, lubricating oils of every colour and specific gravity can be obtained from it; wax also for the manufacture of paraffin candles, naphtha, and consequently benzole (from which the fashionable dyes, magenta, rosenine, aniline, &c., are obtained), pitch, &c., &c., all of them having several other applications. It is reported on the very best authority, that they have discovered from it now, an available substitute for spirits of turpentine for paints, and also a solvent for india-rubber, results, I understand, that they have not effected in America or Canada, and the importance of which cannot be over-estimated.

"In my first circular it was stated that some 7,000 barrels of crude and refined were on the way to this country, and the *Times* of the 13th inst., mentions 8,000 barrels on the way to London. There are 10,000 barrels coming to Liverpool, and 2,000 barrels to Glasgow, in all about 20,000 barrels (or £100,000 sterling, and the trade not six months old), a simple tithe of what we want! American hostilities and the ice in the St. Lawrence (although we have still St. John's, New Brunswick) may stop supplies to some ex-

tent, but I have no doubt the future will vindicate the expectations I have so frequently expressed."

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS.

(Continued from page 34.)

PRODUCTS OF PERU.—(Report by Mr. Wilthew, British Consul at Islay, on the Trade of that Port.)—Islay is a small town in the department of Arequipa, built on a rising ground overlooking the bay, skirted on the north by the coast range of hills (the highest of which, San Andres, serves as a good landmark for vessels visiting the port), and having a sandy plain towards the east and south. The houses are mostly of wood. The population is about one thousand—an indolent race. The climate delightful. There are a governor of the town, captain of the port, custom-house employes, and a magistrate. There is only one Consul resident at Islay, that of her Britannic Majesty. The harbour is safe, though small; but subject occasionally, during the winter season, to a heavy swell, which sets in from the south-west. The anchorage is good, and there is deep water to within a few yards of the shore, which is bold and rocky. The mountain of San Andres before mentioned, the highest on this part of the coast, bears from the anchorage, north-and-by-east-half-east, by the compass. There is a small mole, principally of iron, erected in the year 1853, which renders the landing of goods and passengers much more easy and safe than before, though even now, during the winter season, the former cannot always be landed on account of the heavy swell. The port charges are two reals per ton on the registered tonnage, and eight dollars anchorage for vessels proceeding from any foreign port, and six dollars anchorage if from a Peruvian port, where the charges have been already paid; besides which, in either case, four dollars and a-half to the captain of the port for license, visit, &c. Formerly, there was a duty of one per cent. levied on all packages landed and embarked, as a mole duty, but that is now done away with. The steamers of the Pacific Steam Navigation Company call four times a month:—on the 1st and 16th on their way from Panama to Valparaiso, and on the 7th and 22nd on their return. Vessels seldom come direct from Europe to this port; they generally touch first at Arica, where, if they discharge they take in barilla (copper ore), and complete their cargo here with wool and Cascarilla (bark). Islay is the port of entry for the departments of Arequipa, Puno, and Cuzco; and, after Callao, is the port of most importance in the public of Peru as regards the amount of duties furnished to the Government by the Custom-house. The exports from Islay consist of wool, bark, and a small amount of specie. The wool brought from the departments of Puno and Cuzco to this port for exportation is from the sheep, llama, the alpaca, and the vicuna. Besides sheeps' wool, of a very ordinary quality, there is also a superior quality shipped, the breed having been much improved of late years by the introduction of rams from England, and likewise of Merino sheep from Australia. The wool of the llama is very coarse, and very little is exported. The alpaca wool is generally in great demand, and a large quantity of it is yearly shipped from this port. The vicuna is wild, and grazes on the tops of the highest mountains of the chain of the Cordillera; sometimes 15,000 feet above the level of the sea. These animals are caught by the Indians, and killed, and their skins brought to Arequipa, where the wool is taken off. Notwithstanding, there is no apparent diminution in their numbers.

In the time of the Incas the vicuna was a domesticated animal. On account of the great demand for alpaca wool, owing to the great number of materials now manufactured from it, these animals are much more taken care of than formerly by their owners the Indians, and have greatly increased in number. An attempt has

been made to cross the breed of the alpaca with the vicuna, and it has succeeded on a small scale. The wool produced by this breed is even more soft than that of the vicuna, and of a more silky texture; but, on account of the difficulties attending the breeding of this animal, called paco-vicuna, it will, I fear, never prove of any general utility. The person who conceived the idea, and who has succeeded in procuring the breed, enjoys a pension of six hundred dollars from the Peruvian Government. By a decree of the Peruvian Government the exportation of the llama, alpaca, and vicuna, is prohibited.*

It is calculated that of the wool exported at this port nine-tenths are shipped to England, the remaining tenth part to Hamburgh and to the United States. The cascarilla, or Peruvian bark, shipped at this port, is from Bolivia, smuggled over the frontier. It is considered to be of an excellent quality, yielding a large proportion of quinine. A small quantity of it is shipped for France, the rest to England.

In the department of Cuzco there are several gold mines, or washings, from one of which, called "Copana," a considerable quantity of gold is taken every year. Likewise a silver mine, the ore of which is considered very rich, but the works are on a very small scale. There are also several copper mines, some of which are now being worked, as an experiment, but I fear the transport of the ore will be too expensive to leave a profit.

In the department of Puno, and in the neighbourhood of the city, there are a number of silver mines, most of them worked on a small scale; one of them is situated about half a league from the city of Puno, and called the "Cerro;" it is worked by a company of Peruvians. The ore extracted, which is very rich, is carried along an "adit," of more than 2,000 yards long, in some parts in boats (there being so much water), and in others, over iron rails laid down for the purpose, to the establishment of the "Manto," there to be crushed by a machine worked by steam, erected by an Englishman. This mining establishment is considered to be the best in South America, but, on account of the want of funds, and of disagreements between the members of the company, the work carried on is comparatively on a small scale.

At a distance of about fifteen leagues from the city there are other rich silver mines worked, and in the neighbourhood of them there are two establishments where the ore is ground. There are also gold washings in the department of Puno, and on the other side of the Cordillera, a gold mine of some importance is now being worked, called "Monte Bello;" a very rich vein has been discovered, out of which have been taken lumps of almost pure gold, and considerable machinery is being erected for extracting the precious metal from the ore. In the river called the "Challuhuaveo," which runs at the foot of the mountain, considerable quantities of gold are found; there are likewise four "placers" being worked.

In the department of Arequipa the mines that were formerly worked are now neglected.

In the whole of the southern part of Peru there are mines of gold, silver, copper, and quicksilver, but most of them are neglected for want of funds to procure proper machinery to work them, and from the want of companies (the formation of which does not seem to be adapted to the characteristic disposition of these people), as also from the want of support and protection on the part of the Government to this branch of industry, which in former times was so productive.

A part of these precious metals are shipped at this port for Europe, on board the steamers, the value of which, on an average, amounts yearly to about five hundred thousand or six hundred thousand dollars, or say, one hundred thousand, or one hundred and twenty thousand pounds sterling.

* Notwithstanding it is necessary to kill the vicuna to obtain the wool, that animal not being domesticated, no diminution is perceptible in their numbers.

The exports and imports at this port during the year 1856 have differed but slightly from those of the two or three preceding years.

The exports may considerably increase, as wool, the principal article of export from this place, is in great demand, particularly the alpaca wool, the price of which keeps up in the English market, on which account that animal, the alpaca, is now much more taken care of than formerly, and consequently their numbers greatly increase.

As most of the cascarilla, or bark, exported from this port comes from Bolivia, and is smuggled over the frontier, the exportation is never very large; still it appears to be on the increase, and the quality is excellent.

The export of precious metals rather diminishes than otherwise, on account of the want of hands to work in the mines; civil dissensions, and a frightful malady that reigned in the interior for some months at the commencement of the year having made sad havoc among the Indian population.

The following is the comparison between the exports and imports of the years 1853 and 1856:—

1853	£314,140	} Exports.
1856	401,786	

Difference of 87,646 in favour of 1856.

1853	£257,732	} Imports.
1856	392,724	

Difference of 134,992 in favour of 1856.

Home Correspondence.

RAILWAY TRAVELLING.

SIR,—Mr. Baker, in his paper on this subject, assumed that constant daily railway travelling produced injurious effects on the health of railway travellers. He also suggested that the injurious effect was less in second-class carriages than in the first-class, and less in third than in second.

I will not now stop to inquire whether his view of the cause of the result he affirms be correct, but I hope you will allow me to request that our *Journal* may be used as the means through which facts on this important subject may be collected, and when collected, compared and analysed for the benefit of the public.

The first step in such an inquiry is, to collect facts, and this can only be done efficiently if a large number of railway travellers will be good enough to answer, with care, a series of questions compiled with a view to elicit information on this very interesting question.

With your permission I will submit a series of questions to the readers of the *Journal*, and if those whose experience enables them to do so, will be good enough to forward their replies to the office of the Society, addressed either to the Secretary or to me, I will undertake to publish the results in the *Journal*, as soon as my time will permit.

I am, &c.,

WILLIAM HAWES.

1. Do you travel daily, or nearly so, by railway?
2. How many miles each day?
3. State the hours of travelling and of your meals?
4. For how long a period have you been travelling regularly?
5. Which class do you travel by?
6. Have you found any inconvenience from this regular railway travelling and, if so, of what nature?
7. Do you sleep while travelling, and, if so, does sleep, in a carriage refresh you, as for instance in a chair?
8. Do you read or otherwise employ your time during your journey, or did you do so at one time, and have to give it up?

STEERING OF STEAMERS.

SIR,—I have read with much interest several letters which have appeared lately in your excellent *Journal* on the subject of the Steering of Steamers, but none of the proposed plans appear to me so simple as that which I will now describe.

The object is to turn a steamer about in either direction without using the rudder, or giving her headway, and to be able to adapt the new contrivance to vessels already in existence, such as the *Warrior* or *Great Eastern*, without much difficulty or cost.

The plan I suggest is this:—

In either end of the hold of the vessel, deep below the water line, and as far forward or aft as possible, fix a horizontal tube athwart-ships, open at each end, and passing through the ship's side, so as to communicate with the water. Next, let there be another tube fitted into the under side of the first, and passing vertically downwards through the ship's bottom into the water. Lastly, let a cylinder and piston be fitted to the middle of the first tube, so as to work in any convenient direction. The piston must be solid, and without valves, but the first tube which goes athwartships must have a valve at each end opening outwards, and capable of being fixed, when necessary, by the engineer.

Nothing more is required. The arrangement resembles a forcing pump, and it acts by drawing in water through the hole in the bottom when the piston is raised, and projecting it when the piston descends, through either side of the ship, according to which of the valves is fixed, which is determined by the direction in which she is to be turned.

The rapidity with which this contrivance would turn the ship, will depend, of course, upon the size of the tubes and cylinder, and the power of the engine.

Another plan, which is even simpler, and might be preferred, is to do without the vertical tube with the hole through the bottom, and merely use the tube which is placed athwartships. In that case the valves must be made either to open inwards or outwards, as may be required, so that when one opens outwards the other opens inwards, then, when the piston is raised the water will enter through the hole in one side of the vessel, and when it descends will be discharged through the opposite hole. Both actions of the piston will then tend to turn the ship.

This simple contrivance could be adapted to the *Great Eastern* or *Warrior* at small comparative cost, and by its means either of these vessels could be turned in her own length without the rudder. There is nothing external to the ship which could get out of order, or be carried away in action. The valves might work rather loosely in the tubes, and need not work perfectly tight, and the mode of fixing them or altering their action, as occasion may require, is already in use in various machines.

My plan is not new. There are upwards of fifty patents for a similar thing, one of the earliest of which was granted to Daniel Bernoulli, the celebrated mathematician. A similar method may be applied as a means of propulsion, and a steamer was actually built on this principle and used on the Clyde in the year 1812. How it answered I cannot say, but steam engines were not then what they are now, and it is, I think, a plan quite sound in theory, and worth trying again.

I am, &c.,

THOMAS SUTTON.

St. Brelade, Jersey, Dec. 23, 1861.

ON ATMOSPHERIC DISINFECTION.

SIR,—From time immemorial it has been a well-known practice to light large fires in marshy and other districts, in almost every quarter of the world, as it has been invariably found that this proceeding produced a very beneficial, though temporary, effect on the salubrity of these districts. This result has hitherto been attributed to the influence of the heat evolved, by which a strong current of air is induced, and, consequently, the stagnant atmosphere is set in thorough circulation.

Now, however, that the absorbent and oxidising effects of charcoal on deleterious gases and vapours are so well understood and generally admitted, I think the true cause of the beneficial action of great fires in such situations is owing to the large quantity of minutely divided charcoal, which, in the shape of smoke, is carried up into the atmosphere. These particles of charcoal absorb and destroy the deleterious gases.

Since this is the case, I think it is clear that the object in these operations ought to be to make as much smoke as possible, and that green wood, or other moist fuel, will be found the more suitable substance for this purpose.

I am, &c.,

JOHN STENHOUSE, LL.D., F.R.S.

17, Rodney-street, Pentonville, December 16th, 1861.

ELEMENTARY EXAMINATIONS.

SIR,—It is difficult to over-estimate the advantages of a uniform system of Elementary Examinations, not only as an efficient, practical stimulus to self-improvement and the continuance of the imperfect education commenced in day-schools, but as a preparation for the more advanced attainments required in the examinations of the Society of Arts. If the latter have influenced hundreds for their permanent advantage, the former will affect the welfare of thousands, and it only needs general co-operation by Local Boards throughout the kingdom to render the scheme put forward by the Central Committee a great success.

The chief duty of the Central Committee is to provide the necessary papers for Elementary Examinations in order to ensure a uniform standard, and, as a primary step in the performance of its important duties, a scheme has been issued for the year 1862*, fixing four evenings near the middle of the month of March, when the Elementary Examinations will be held in all places simultaneously. The papers will comprise two sets, the one suited for junior and the other for senior candidates.

From the diversity which almost inevitably exists in the attainments of the members of Educational Institutes, even in the mere rudiments of knowledge, a distinction has been made between junior and senior candidates in the extent of proficiency, which will entitle them to the respective certificates—the one being a stepping-stone to the other; but this is not on that account a distinction as to the age of the candidates. Experience has abundantly proved that in the same class of life the boy is often far in advance of the adult in the extent of his scholastic learning, and the examinations will, consequently, be solely a test of ability without reference to age or sex, persons of all ages and both sexes being admissible to both grades.

In any system of education it is of course impossible, as it would be dangerous, to ignore religious teaching; but as points of doctrine are fertile subjects of controversy, the examinations have been confined to a knowledge of the facts of the Gospel, and should even this be objected to or be deemed a stumbling block, the candidate has the option of selecting two subjects, of which Gospel History need not be one. It rests, therefore, with the candidate, and not with the examiners, if the result of the religious instruction, which he should have received, be not stated on the certificate.

It must be obvious, that several very important advantages will be gained by the operations of the Central Committee, if the Local Boards of Examination, by adopting the scheme, avail themselves of the opportunity afforded them. In the first place, the certificates to be granted, though awarded on the responsibility and according to the judgment of the Local Examiners, will have a national value, because they will be based upon a fixed and uniform standard of qualification. They will, therefore, pass current in all parts of the kingdom as trustworthy evidence of the abilities, attainments, and character of those who may hold them; and the young man seeking employ-

ment, for which the possession of certain qualities is indispensable, may confidently appeal to his certificate, whether granted in Leeds, in Southampton, or in Exeter.

In the second place, the Local Board will not have to experience the difficulty which, in many places, has been found almost insuperable, of having to prepare a set of questions in the several subjects of examination, and to incur the expense of printing them. All that is necessary will be to make application to the Secretary of the Central Committee at the Society of Arts, on or before the 10th of February preceding the examinations, for the requisite papers, which will be supplied at a charge of sixpence for each candidate, and to make provision that the indispensable conditions be complied with, so that the examinations may be simultaneous in every place, and no unfair advantage be taken by any premature knowledge of the examination papers.

In the third place, by commencing the stimulus of granting certificates for attainments in learning, to a class of pupils younger in age or lower in qualification, a systematic and more effectual preparation will be made of candidates for the higher standard of the Society of Arts. It is when the youth has barely mastered the mere rudiments of knowledge that there exists the least incentive to persevere. He feels all the labour and drudgery of the task before him, while he is yet unable to appreciate the future benefits, and therefore it is the more necessary that he should be induced to persevere in his exertions by the probability of success in acquiring some reward in the certificate. This would be the stamp of approval, and the proof of what he had accomplished. The majority of the youth of our working population are by their labour made in some measure independent of parental control, and as to them their growth in ignorance or in knowledge is too often a matter of choice, or rather of indifference, and their choice dependent upon the gratification of the present rather than self-improvement for the future, it is of the more consequence that some incentive should be offered to them, that they may continue by voluntary effort the imperfect education gained in the short time spent at the day school. But, familiarised with the practice of examination in the junior class, and stimulated by the certificate already gained, they will proceed more readily and boldly to prepare themselves for the senior certificates, until they feel that the higher class certificates granted by the Society of Arts are within their reach, and thus in a very few years a much larger number of candidates may reasonably be anticipated.

The Central Committee does, however, but provide the means, and thereby remove many of the difficulties which have hitherto existed. It rests with the teachers of evening classes in our Mechanics' Institutions to stimulate their pupils to increased exertions, to bring prominently and clearly before them the advantages offered, and to prepare them for success in their first essay at examination. It rests also with Local Educational Boards to make the scheme successful, by giving publicity to its details, and making every necessary provision for bringing it into efficient operation.

In places where no Local Board exists, but where candidates for examination might be found, immediate steps should be taken to form a Board in connection with the Society of Arts, and wherever practicable the Institutions in a county or district should unite to constitute a union for mutual co-operation, and material assistance might also be given by Local Boards undertaking to examine the papers and award the certificates for all the Institutes within a certain limit. This is specially needed at Birmingham, where there are several evening schools to which the system of Elementary Examinations would be beneficial, but no union exists, and the Local Board is confined to the Midland Institute.

It should ever be borne in mind that the future welfare of Great Britain, and her continued existence as a mighty nation, depends mainly, if not solely, upon the moral and mental training of her population. No acquisition of

* See vol. ix., p. 682.

foreign markets for her productions, no extent of persevering energy in her industry, will compensate for the ignorance of her people. They will prove but the efforts of brute force or misdirected skill, liable to disastrous fluctuations and ruinous reverses. The Great Exhibition of 1862 will again bring the people of this country into competition with their rivals of the world, but little need be apprehended from comparison with the artists or artisans of other climes, if the education commenced, however imperfectly, in our day schools be continued in the evening classes of our Mechanics' Institutes, and their operations be encouraged, and their results tested and rewarded, by the central system of Elementary Examinations.

I am, &c.,
BARNETT BLAKE.
Leeds, 16th December, 1861.

Proceedings of Institutions.

AVENHAM INSTITUTION FOR THE DIFFUSION OF KNOWLEDGE (PRESTON).—The thirty-third annual report of this Institution was adopted at the annual meeting of the members, held on the 1st of October, 1861, Mr. WILLIAM DOBSON, Vice-President, in the chair. With one exception, perhaps, the position of this Institution has undergone but little change since the date of the last annual report. The exception here alluded to will, however, be regarded as important, referring, as it does, to the improved state of the finances, a considerable reduction in the debt on the building having been effected during the year. In other respects, no decided advance can be said to have been made upon the satisfactory position held by the Institution at the beginning of the year. That position has, however, been fully maintained, notwithstanding some unfavourable circumstances with which the Institution has had to contend. For several years past it has been necessary to appropriate no inconsiderable portion of the annual income of the Institution to the payment of the charge for interest on the building fund debt. In this way the usefulness of the Institution has no doubt been much restricted. Early in the official year, therefore, the Council resolved upon measures, which they proceeded to carry out, for the entire extinction of the debt. Owing chiefly to the depression which has so unfortunately overtaken the trade of the district, these measures have not resulted in success so entire as was hoped for. The Council are, however, afforded the satisfaction of announcing that the debt has been reduced from £606 17s. 9½d., the amount owing at the beginning of the year, to £400 13s. 3½d., the present amount. The debt may be considered still further reduced by a donation of £50, kindly promised by Mr. Alderman Miller; also by donations promised by Mr. Alderman Walmsley, and other friends of the Institution. For the success hitherto attained in the liquidation of the debt, the Institution is under great obligations to his worship the Mayor, John Goodair, Esq., who, with a liberality which will be fully appreciated by the members generally, promptly responded to the appeal of the Council by a donation of £100. The Institution is also greatly indebted to Mr. Ainsworth, for his donation of £50. This donation, it will be remembered, was originally promised on condition that a sum equal to the remaining portion of the debt should be obtained from other sources. Seeing, however, that the Council could not with propriety prosecute their appeals, in the present state of the town, and that the possibility of fulfilling the condition was thus indefinitely postponed, Mr. Ainsworth at once paid over his donation, with the considerate regard for the interests of the Institution which he has shown in so many former instances. The number of subscriptions received during the year is 533, being 29 less than were received the year previous. The report states that this slight falling off is attributable to the extreme severity of the weather in the months of December and January last. Usually a large increase in the number of subscribers takes

place about Christmas. Last year, however, a considerable decrease took place at that time, the severe weather having no doubt kept at home many persons who would otherwise have spent their evenings at the Institution. The weather, severe as it was, had, however, but little effect upon the evening classes, the attendance upon which has been on the whole fully maintained. The Council remark that the means at their disposal still remain very inadequate to the requirements of the classes, the usefulness of which is, for this reason, much circumscribed. Even in their present condition, however, the classes are doing useful work, quietly and unostentatiously, but not, therefore, the less effectively; there are not wanting instances of students to whom the instruction afforded in the classes is known to have formed the stepping-stone to immediate advancement in life. The undermentioned students having successfully passed the Examination of the Association of Mechanics' Institutions of Lancashire and Cheshire, have had awarded to them Certificates of Merit, as follows:—Alice H. Watson, first-class certificate; Alice Smith, second-class certificate; Matthew Harrison (Algebra), second-class certificate; Benjamin Matinson (Mensuration), second-class certificate; Joseph Foster (Arithmetic and Composition), third-class certificate; Benjamin Foster (Geometry), third-class certificate; and William Yates (Composition), third-class certificate. Two series of lectures were delivered during the last season, as follows:—(Tuesday Evening Series) Rev. Canon Parr, "Capital and Labour;" Dr. Witherington, "Curiosities of Insect Structure;" Mr. James Marshall, "Our Mother Tongue;" Rev. St. Vincent Beechey, "The Ancient History of Egypt, in connection with the Bible (two lectures);" Mr. May, "An Hour with Goldsmith;" Preston Elocutionary Association, Elocutionary Entertainment; Dr. D. J. McGowan, "On Japan (two lectures);" (Saturday Evening Series) Mr. J. J. Myers, "Electricity;" Rev. E. D. Rendell, "Chemistry of the Atmosphere;" Mr. W. Dobson, "Incidents illustrative of the Manners and Customs of Preston in the Olden Time;" Mr. F. Cotman, "Life and Times of Alfred the Great;" and Mr. C. Hardwick, "Poetic Elocution; or, the Art of Reciting Poetry in Public." The Tuesday Evening Series proved on the whole eminently successful; the subjects having been well chosen, and treated in a style at once able and popular; while the attendance, in nearly every instance, was large and respectable. The Saturday evening series were entered upon with the view of providing, for the operative classes especially, means of relaxation at once instructive and amusing; and thus affording to the working man the opportunity of passing the Saturday evening at least harmlessly, if not usefully. So far as the series extended, it may be said to have been as successful as could have been looked for. The lectures were, in every instance, delivered gratuitously, and, though not attended by numerous audiences, were listened to throughout with marked interest. The partial success attending them may, therefore, well justify the repetition of a Saturday evening series next season. The lectures, although in other respects successful, resulted in a pecuniary loss. In the last Annual Report it was stated that the site of the Institution had been enlarged, by the purchase of an adjoining plot of land. This purchase the Council deemed it advisable to abandon. To proceed with the purchase would render necessary a considerable outlay, and would also entail a considerable present annual charge for ground-rent upon the Institution; and as this could be ill afforded in the present state of the finances, the Council have deemed it well to defer to a more favourable opportunity any further negotiations for the land in question. The annual *soirée* of the Institution took place on the 19th December, 1860, in the Exchange-rooms, and was attended with the usual success—the funds of the Institution being benefited by it to the amount of £13 Os. 9d. A further addition of £1 2s. 8d. resulted to the funds from a *soirée* of the Class students, held in the Institution in November last. The

following table shows the number of volumes in the library, and the issue during the past twelve months:—

	No. of Vols. in Library.	No. Issued.	No. Added.
Arts and Sciences	1,393	... 1,640	... 25
History	669	... 749	... 10
Voyages and Travels	530	... 1,180	... 11
Biography ...	620	... 1,106	... 29
Poetry and Drama.....	312	... 577	... 3
Novels and Tales	574	... 7,542	... 43
Miscellaneous Literature, in- cluding Magazines, &c., 2,468	...	2,279	... 109
Total.....	6,566	15,073	230

At the Penny Bank, the accounts opened October 2nd, 1860, were 3,029; September 3rd, 1861, 3,427. Amount due on depositors' account October 2nd, 1860, £620 19s. 7d.; September 3rd, 1861, £533 14s. 4d.

MEETINGS FOR THE ENSUING WEEK.

MON.....	Actuaries, 7,
TUES.	Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).
WED.	Pharmaceutical, 8,
THURS....	Royal Inst. 3. Professor Tyndall, "On Light" (Juvenile Lectures).
FRI.	Archæological, 4,
	Royal Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).
SAT.....	R. Inst., 3. Professor Tyndall, "On Light" (Juvenile Lectures).

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, December 20th, 1861.]

- Dated 10th August, 1861.*
1993. A. S. Stocker and A. R. Stocker, Wolverhampton—Imp. in the manufacture of horse shoes, boot heels, wheel tyres, rails, and safes.
- Dated 30th August, 1861.*
2166. J. Bishop, 1A, Gloucester-street, Camden-town—Imp. in the manufacture or weaving of velvet or pile fabrics made entirely or partially of silk, and in looms used for that purpose.
- Dated 13th September, 1861.*
2280. T. L. Murray, Paris—Improved applications of mica previously coloured or metallized for letters and signs, decorating churches, rooms, shops, frames, and other ornamental and useful purposes. (A com.)
- Dated 5th October, 1861.*
2495. W. Clark, 53, Chancery-lane—An improved gas regulator and purifier. (A com.)
- Dated 26th October, 1861.*
2682. F. Barnett, 60, St. Mary Axe—Improved electric danger signals for railways and other cognate purposes.
- Dated 1st November, 1861.*
746. A. Smith, Mauchline, Ayr, N.B.—Imp. in producing or delineating ornamental lines and figures on metal and other surfaces.
- Dated 9th November, 1861.*
2825. T. O'Reilly, Shaw-street, Dublin—A new or improved table or apparatus for tailors to work at without sitting.
- Dated 13th November, 1861.*
2859. F. Coney, Waterloo-road—An improved stock for brooms.
- Dated 16th November, 1861.*
2889. W. Naish, Wilton, Wiltshire—Imp. in the manufacture of saddlecloths, known as "numnahs."
- Dated 19th November, 1861.*
2909. J. Schloss, Cannon-street West—Imp. in pouches.
- Dated 20th November, 1861.*
2913. E. F. Smith and T. Swinerton, Dudley—Imp. in the manufacture of coke, and in apparatus connected therewith.
- Dated 22nd November, 1861.*
2933. R. De Clercq and E. Chazelles, Brussels—Imp. in apparatus for raising and supplying water to boilers, and for other purposes.
- Dated 25th November, 1861.*
2953. J. Macintosh, North Bank, Regents-park—Imp. in obtaining and applying motive steam and liquid power, and in apparatus connected therewith.
2955. J. Ronald, Liverpool—Imp. in machinery used for spinning hemp, flax, manilla, wool, and like fibrous material, and for the manufacture of "topped-up," "formed," or "laid" thread, twine, cord, line, cable, and other cordage.

Dated 26th November, 1861.

2976. J. H. Johnson, 47, Lincoln's-inn fields—A new or improved apparatus for supporting the womb in cases of prolapsus uteri. (A com.)

Dated 28th November, 1861.

2999. C. Stevens, 31, Charing-cross—Imp. in furnaces for working iron ore. (A com.)
3000. J. M. Rowan, Glasgow—Imp. in the manufacture of railway wheels, and in apparatus to be used therein.

Dated 29th November, 1861.

3008. L. H. C. J. Carle, Brownlow-street, Holborn—Imp. in means or apparatus for indicating and registering the "score" for billiards and other games.

Dated 5th December, 1861.

3048. J. Knowelden, Southwark—Imp. in pumps.
3052. J. Cochrane, Harburn, Mid Lothian—Imp. in wet gas meters.
3054. C. Davis, Bancroft-place, Mile-end—An improved composition for coating metal and wood to preserve them from decay, applicable as a substitute for copper and other sheathing or other compositions now in use for coating ships bottoms to protect them from the injurious action of water.

Dated 6th November, 1861.

3058. J. Bailey and W. H. Bailey, Salford—Imp. in apparatus for indicating the pressure of steam and gases, the amount of vacuum, the flow of fluids, the weight of materials, and the speed of bodies either revolving or traversing, and also the employment of aluminium or its alloys in the manufacture of the same.
3060. J. D. Napier, Glasgow—Imp. in brakes. (A com.)
3064. J. Howard, Bedford—An imp. in the construction of haymaking machines.
3066. J. J. Russell and B. J. Brown, Wednesbury—Imp. in apparatus used in the manufacture of paper tubes.

Dated 7th December, 1861.

3670. G. T. Bladen, Grove-lane, Camberwell—Imp. in chimney tops for the prevention of down draughts in chimnies.
3072. Major-General W. N. Hutchinson, Devonport—Imp. in projectiles and ordnance, and in apparatus to be used therewith.
3074. T. Fearn and T. Cox, jun., Birmingham—The application of certain electro deposits to the coating or finishing of the stretchers, ribs, and other metal portions of umbrellas and parasols.

Dated 9th December, 1861.

3082. J. Fordred, Brighton—Imp. in treating linseed oil.
3086. W. Mason, 40, Canton-street, Poplar—Imp. in applying armour or thick plating to ships and other structures.
3088. S. Newton, 17, Nutford-place, Edgeware-road—Imp. in apparatus for steering and stopping vessels.

Dated 10th December, 1861.

3090. H. Alexander, Glasgow—Imp. in turning apparatus for making gas burners.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

3101. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—Imp. in jack machinery for moving heavy bodies. (A com.)—11th December, 1861.
3112. M. A. F. Mennons, Furnival's-inn—An improved means of de-fecating and purifying cane and other saccharine juices. (A com.)—12th December, 1861.

PATENTS SEALED.

[From Gazette, December 20th, 1861.]

December 20th.	
1613. E. Dance.	1643. W. McNaught.
1615. J. Ferrabee.	1645. H. Hamer.
1616. R. Howson.	1646. J. C. Smart & A. Aitchison.
1634. J. R. Tussaud and F. C. Tussaud.	1654. H. J. Rouse.
1637. J. Higgins and T. S. Whitworth.	1666. W. Clark.
	1714. L. Roughton.
	2202. L. R. Bodmer.
	2482. T. G. Ghislin.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, December 20th, 1861.]

December 16th.	December 17th.
2896. J. Kerr.	2900. J. Mackenzie.
3007. J. H. Johnson.	

[From Gazette, December 24th, 1861.]

December 19th.	December 21st.
294. D. Edleston.	2964. R. Hornsby.
295. T. Steven and T. Scott.	2978. H. Hutchinson.
	2924. M. Kenney.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, December 24th, 1861.]

December 19th.	December 20th.
2684. W. Milner.	2692. W. Bertram.
	2742. G. J. Benson.